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GEOMETRY.

86. **Proposed by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy in Ohio University, Athens, O.**

Prove that the four conics which have S for focus and which touch the three sides of each of the triangles ABC, AEF, BFD, CDE, have their lata-recta equal.

87. **Proposed by WALTER HUGH DRANE, A. M., Professor of Mathematics, Jefferson Military Academy, Washington, Miss.**

Given any two straight lines in space, AB, CD, which do not intersect. So construct upon one of the lines as base, a triangle, having its vertex in the other line, such that its perimeter shall be a minimum.

⁂ Solutions of these problems should be sent to B. F. Finkel, not later than March 1.

CALCULUS.

68. **Proposed by EDWARD DRAKE ROE, Jr., A. M., Associate Professor of Mathematics, Oberlin College, Oberlin, Ohio.**

If $a^{x^{x^{\cdot^{\cdot^{\cdot^{x}}}}}}$ to r steps be denoted by $a^{\overset{r}{x}}$, and if $y=x^{\overset{r}{x}}$, prove that

$$D_xy=x^{\overset{r}{x}+\overset{r-1}{x}+\dots\overset{1}{x}}(\log x)^{r-1}(1+\log x)+\sum_{k=2}^{k=r}x^{\overset{r}{x}+\overset{r-1}{x}+\dots\overset{k-1-1}{x}}(\log x)^{r-k}.$$

69. **Proposed by GEORGE LILLEY, Ph. D., LL. D., Professor of Mathematics, State University, Eugene, Ore.**

An elliptic fence encloses a field whose major and minor axes are $2a$ and $2b$, respectively. The ends of a rope, the length of which is equal to the length of the fence, are fastened outside the fence and at the extremities of the major axis. A horse is tethered by means of a ring which slides freely on the rope. Over how much ground can he feed? What is the length of its outside border? Find these values in square feet and feet, true to six decimal places, when the area of the field is one acre and $a=2b$.

⁂ Solutions of these problems should be sent to J. M. Colaw, not later than March 1.

MECHANICS.

63. **Proposed by A. H. BELL, Hillsboro, Ill.**

From a horizontal support at a distance of ten feet apart, a beam 5 feet long and 10 pounds weight is suspended by ropes attached to each end. The ropes are 3 and 5 feet respectively, in length. Required the angles made by the ropes and horizontal support. Also the stress upon each rope.

64. **Proposed by FREDERICK R. HONEY, Ph. B., Instructor in Mathematics in Trinity College, New Haven, Conn.**

Let the isosceles triangle abc, whose plane is vertical, and whose base bc is horizontal, and supported at each end b and c, represent three rods jointed at the points a, b, and c. Let any load L be suspended at the vertex a. It is required to find the value of the angle between the sides of the triangle and the base which shall make the sum of the weights of the rods a minimum, the length of the base bc being fixed.

⁂ Solutions of these problems should be sent to B. F. Finkel, not later than March 1.